

VERSION WITH MARKINGS TO SHOW CHANGES MADEIN THE SPECIFICATION:

Specification at page 5, line 8:

The substrate of the invention is [suitably] suitable for use in the preparation of a composite membrane for use in a fuel cell. When for use in a fuel cell, the total thickness of the membrane is less than 200 $\mu\text{m}$  and preferably less than 100 $\mu\text{m}$ .

Specification at page 6, line 18:

2. Perfluorinated or partially-fluorinated polymers further having aromatic rings, such as those described in PCT patent specifications numbers WO 95/08581[, WO 95/08581] and WO 97/25369, which have been functionalised with SO<sub>3</sub>H, PO<sub>2</sub>H<sub>2</sub>, PO<sub>3</sub>H<sub>2</sub>, CH<sub>2</sub>PO<sub>3</sub>H<sub>2</sub>, COOH, OSO<sub>3</sub>H, OPO<sub>2</sub>H<sub>2</sub>, and/or OPO<sub>3</sub>H<sub>2</sub>. Also included are radiation- or chemically-grafted perfluorinated polymers, in which the perfluorinated carbon chain is activated by radiation or chemical initiation in the presence of a monomer, such as styrene, which can be functionalised to contain an ion-exchange group. Suitable perfluorinated polymers include, for example, PTFE, fluorinated ethylene-propylene (FEP), tetrafluoroethylene-ethylene (ETFE) copolymers, tetrafluoroethylene-perfluoroalkoxy (PFA) copolymers, poly(vinyl fluoride) (PVF) and poly(vinylidene fluoride) (PVDF).

IN THE CLAIMS:

1       3. (Amended) A substrate according to claim 1 [or claim 2],  
2       wherein the fluorinated hydrocarbon polymer comprises one or more non-ion-  
3       conducting polymer(s).

1       4. (Amended) A substrate according to [any preceding] claim 3,  
2       wherein the non-ion-conducting polymer is selected from the group consisting of  
3       polytetrafluoroethylene (PTFE), fluorinated ethylene-propylene (FEP),

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4 tetrafluorethylene-ethylene (ETFE) copolymers, poly(vinylfluoride) (PVF) and  
5 poly(vinylidenefluoride) (PVDF).

1               5. (Amended) A substrate according to [any preceding] claim 1,  
2 [which] wherein the silica comprises a colloidal silica[:PTFE mixed binder] and the  
3 polymer comprises PTFE.

1               6. (Amended) A substrate according to [any preceding] claim 1,  
2 wherein the ratio of silica to polymer is in the range of from 95:5 % to 5:95 % based  
3 on w/w solid materials in the binder mixture.

1               8. (Amended) A substrate according to [claim 6 or] claim 7  
2 wherein the ratio of silica to polymer is about 50:50 %, based on w/w solid  
3 materials in the binder mixture.

1               9. (Amended) A substrate according to [any preceding] claim 1,  
2 wherein the mixed binder is in the form of a dilute aqueous dispersion.

1               10. (Amended) A substrate according to claim 9 wherein the  
2 [mixed binder is in the form of a] dilute aqueous dispersion [of] has about 10wt%  
3 solids in the aqueous solution.

1               11. (Amended) A substrate according to [any preceding] claim 1,  
2 wherein the fibres [comprises] comprise at least one of glass [and/or] or silica.

1               12. (Amended) A substrate according to [any preceding] claim 1,  
2 wherein the fibres have a diameter in the range of from 0.1µm to 50µm.

1               14. (Amended) A membrane according to claim 13 which, when  
2 [tested by the method described herein in the Examples, results in] dried then  
3 boiled in water undergoes less than or equal to about ±16 % change in its area[;  
4 preferably, ≤±10 % area change; more preferably, in the range of from about 0 to  
5 about 6 % expansion].

1               15. (Amended) A process for preparing a porous substrate  
2 according to [any one of claims] claim 1 [to 12], which process comprises applying  
3 an aqueous dispersion of silica and a fluorinated hydrocarbon polymer to a porous  
4 matrix of wet fibres.

1           16. (Amended) A process for the manufacture of a substrate  
2 [according to any one of claims 1 to 12], [which process comprises] comprising the  
3 steps of

4           (a) dispersing [the] fibres in water to form a slurry;  
5           (b) depositing the slurry onto a mesh bed to form a fibre  
6           network;  
7           (c) drying and compacting the fibre network; and  
8           (d) applying, before or after step (c), a dispersion of [the] a  
9           binder comprising both silica and a fluorinated hydrocarbon  
10           polymer.

1           17. (Amended) A process for the manufacture of a membrane  
2 [according to claim 13 or claim 14], [which process comprises] comprising the  
3 steps of

4           (i) forming a porous substrate [of, preferably randomly  
5           orientated individual, mixed amorphous silica fibres bound  
6           with a binder by a process] according to claim 16; and,  
7           thereafter,  
8           (ii) impregnating the fibre matrix substrate with a polymeric  
9           material to produce a membrane.

1           19. (Amended) A membrane electrode assembly comprising [a  
2           substrate according to any one of claims 1 to 12 and/or] a composite membrane  
3           according to claim 13 [or claim 14].

1           20. (Amended) A fuel cell comprising [a substrate according to  
2           any one of claims 1 to 12 and/or] a composite membrane according to claim 13 [or  
3           claim 14].

Claims 21-23 have been added.

DEPARTMENT OF TRADE AND INDUSTRY